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ARTICLE

Exploring Gender and Academic Major Differences in Academic Self-Efficacy Among University Students in Xi'an, China

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ABSTRACT

This study examines the relationship between academic self-efficacy and academic performance among university students in Xi'an, China, while also exploring disparities in self-efficacy based on gender and academic major. Grounded in Bandura's social cognitive theory, the research employs a quantitative, cross-sectional correlational design. A total of 389 undergraduate students from 29 universities were recruited through stratified random sampling. Data were collected using the College Academic Self-Efficacy Scale (CASES) and the Academic Performance Scale (APS) and analyzed using Pearson correlation and independent samples t-tests. The results reveal a moderate to strong positive correlation between academic self-efficacy and academic performance ($r = 0.594$, $p < 0.001$), indicating that students with higher self-efficacy tend to achieve better academic performance. Additionally, male students exhibited significantly higher self-efficacy levels than female students, and STEM students reported greater self-efficacy

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compared to non-STEM students. These findings highlight the role of academic self-efficacy in student success and suggest that universities should implement targeted interventions, such as mentorship programs and structured feedback mechanisms, to enhance self-efficacy. Addressing gender disparities and providing additional support for non-STEM students can further promote equity in higher education. Future research should consider longitudinal studies and additional contextual factors to deepen the understanding of self-efficacy development and its impact on academic performance.

Keywords: Academic Self-Efficacy; Academic Performance; Chinese University Students; Gender Disparities; STEM and Non-STEM Fields; Higher Education

1. Introduction

Higher education significantly shapes individuals' academic and professional paths, and understanding factors that influence student performance remains central to educational research. Among these, academic self-efficacy has drawn considerable attention for its strong links to motivation, learning strategies, and achievement. Academic self-efficacy, grounded in Bandura's ^[1] social cognitive theory, refers to an individual's belief in their ability to successfully complete academic tasks and achieve desired outcomes. As an essential psychological construct, academic self-efficacy influences students' motivation, learning strategies, and overall performance in educational settings ^[2]. Research consistently shows that students with higher self-efficacy demonstrate greater persistence, set challenging goals, and adopt effective coping strategies when facing difficulties ^[3]. In Western contexts, it has been widely recognized as a reliable predictor of student achievement across disciplines and educational levels ^[4]. Therefore, exploring the relationship between academic self-efficacy and academic performance in the context of Chinese higher education is crucial for designing effective interventions and support systems.

However, while the relationship between academic self-efficacy and academic performance has been well established in Western literature, its applicability in non-Western educational systems remains an area of interest. Chinese students face intense academic pressure due to highly competitive university entrance exams, rigorous coursework, and high societal expectations regarding educational achievement ^[5]. This pressure often leads to increased anxiety and stress, making academic self-efficacy a crucial factor in determining student success ^[6]. Furthermore, factors such as gender and academic major

may also influence self-efficacy, yet their impact has not been thoroughly examined within the Chinese academic environment. Previous research has shown that sociocultural factors and disciplinary norms may lead to variations in students' confidence levels and academic behaviors ^[7]. Xi'an, a major educational hub with a diverse student population, offers an important context to investigate how self-efficacy interacts with performance and how it differs by gender and academic major, particularly between STEM and non-STEM fields. This study which focuses on China, and is based on data from 389 undergraduate students across 29 universities in Xi'an, investigates the relationship between academic self-efficacy and performance, along with variations by gender and academic major. It addresses a research gap by examining self-efficacy within the sociocultural context of Chinese higher education and evaluates its impact on academic success, highlighting group disparities and contributing to the broader literature on self-efficacy in non-Western contexts.

2. Literature Review

2.1. Self-efficacy

Bandura's social cognitive theory conceptualizes "self-efficacy" as an individual's belief in their capacity to execute tasks and achieve desired outcomes ^[8]. This belief influences motivation, effort, and persistence in academic settings, shaping students' ability to overcome challenges and accomplish academic goals. When students successfully complete academic tasks, their confidence and self-esteem improve, reinforcing positive expectations for future performance ^[9]. Conversely, negative feedback or repeated failure can lead to self-doubt, discouraging students from exerting effort in their academic pursuits. A comprehensive

understanding of how self-efficacy develops during the learning process is critical, because it has a substantial impact on learner engagement and ultimate success^[10].

Academic self-efficacy is widely recognized as a significant predictor of learning behaviors, motivation, and academic performance. Studies have shown that students with high academic self-efficacy set higher academic goals, employ effective learning strategies, and demonstrate greater resilience in the face of challenges^[4]. A study conducted by Fonteyne et al.^[11] confirmed that self-efficacy is among the strongest non-cognitive predictors of academic achievement across various disciplines. Furthermore, researchers have examined how different instructional approaches influence students' self-efficacy. For instance, mastery-based learning, structured feedback, and collaborative learning environments have been shown to enhance students' confidence in their academic abilities^[12].

Although extensive research has validated the role of academic self-efficacy in Western educational contexts, there is limited exploration of its impact within Chinese higher education. The highly competitive nature of China's education system, along with cultural and societal expectations, may influence how students perceive their academic abilities and respond to academic challenges. Investigating the relationship between self-efficacy and academic performance within this unique environment can offer valuable insights for educators and policymakers seeking to enhance student learning outcomes.

2.2. Academic Performance

Academic performance, in the context of this study, refers to an individual's engagement, behaviors, and competencies demonstrated throughout the learning process rather than solely their final grades or test scores. It encompasses cognitive, behavioral, and affective dimensions of learning, including participation in academic activities, application of learning strategies, critical thinking, problem-solving abilities, and perseverance in the face of academic challenges^[13]. These aspects collectively contribute to a student's overall development and academic progress, shaping their ability to adapt and succeed in different educational settings^[14].

A key component of academic performance is self-regulation, which involves goal setting, time management,

and the ability to monitor and adjust learning strategies^[15]. Students with strong self-regulatory skills tend to be more engaged in their coursework, actively seek feedback, and persist in overcoming obstacles, leading to a more effective learning process^[16]. Additionally, motivation plays a crucial role in determining academic behaviors. Students with intrinsic motivation, who learn for personal growth and intellectual curiosity, are more likely to demonstrate deep learning approaches, while those with extrinsic motivation may focus more on completing tasks for external rewards^[17].

Academic performance is also influenced by social and environmental factors, such as classroom dynamics, peer interactions, and institutional support. A supportive learning environment that encourages collaboration and active participation fosters students' willingness to engage with academic materials and develop their competencies^[18]. Moreover, students who feel a sense of belonging in their academic community tend to exhibit greater commitment to their studies and demonstrate higher levels of effort and perseverance^[19]. Conversely, high levels of stress and pressure, particularly in competitive educational settings like those found in China, may negatively impact students' engagement and hinder their ability to effectively manage their learning process^[5]. Therefore, it is thus assumed that:

Hypothesis 1: There is a significant positive relationship between academic self-efficacy and academic performance among university students in Xi'an, China.

2.3. Self-efficacy in Gender

According to the social role theory proposed by Eagly^[20], the expectations of gender roles viewed by society greatly influence the individual's behavioral and cognitive patterns. The socially constructed roles define behaviors appropriate to be performed by males and females, respectively, which define their self-perception and beliefs of their abilities. This is the crucial constituent of self-efficacy. It is primarily regarding this that social role theory maintains that from an early age, males and females are socialized by society according to different gender role norms that shape their beliefs and evaluations concerning their abilities. For instance, a male is often socialized with attributes such as being independent, confident, and decisive. These characteristics also align with roles that

focus on leadership, competition, and success based on the performance of tasks, and society generally links these characteristics with high self-efficacy. Female socialization would more often stress the desirability of being soft, cooperative, and sensitive in dealing with other people, aligning better with their functions in care, emotional support, and community harmony. This difference in socialization processes may be reflected in the differences in self-efficacy across various fields.

Research by Hartman and Barber^[21] showed that when females were in an environment that did not emphasize stereotypical gender roles, their self-efficacy in traditionally male-dominated fields increased. A related study by Chan^[22] ascertains that changing gender expectations at school would significantly improve the self-efficacy perceptions of males and females in various disciplines. Evidence of this kind reveals that socialization significantly influences the perception that one has of his or her own beliefs. It is thus hypothesized:

Hypothesis 2: There is a significant difference in academic self-efficacy between male and female university students in Xi'an, China, with male students having higher self-efficacy than female students.

2.4. Self-efficacy in Academic Majors

According to Bandura's social cognitive theory, self-efficacy beliefs are context-dependent and may vary significantly across academic disciplines. These beliefs are shaped by multiple sources, including personal experiences within a given field, previous successes and failures, and social comparisons^[8]. Students develop different levels of self-efficacy based on their academic majors, influencing their course selections, persistence, and subsequent performance in those disciplines^[23]. Mastery experiences, or prior successes in specific academic areas, play a crucial role in shaping self-efficacy beliefs, as repeated success reinforces confidence, whereas failure may lead to avoidance of certain subjects^[12]. This process is particularly relevant in fields such as STEM, where students' self-perceived competence determines their engagement and long-term commitment^[24].

In addition to direct experience, self-efficacy is influenced by vicarious experiences, verbal persuasion, and physiological states^[1]. Vicarious experiences occur when

students observe peers succeeding in academic tasks, particularly when they perceive those peers as similar to themselves^[25]. Verbal persuasion, such as encouragement from instructors and mentors, plays a critical role in fostering confidence, particularly in subjects perceived as challenging or competitive^[26]. Conversely, negative feedback can undermine self-efficacy, leading to decreased motivation. Physiological states, including stress, anxiety, and fatigue, also influence students' self-efficacy levels, as high-pressure academic environments may lead to lower confidence and academic disengagement^[27]. Since different academic fields impose distinct cognitive and emotional demands, understanding the mechanisms shaping self-efficacy within various disciplines is essential for developing targeted educational interventions that promote student success. Therefore, this article proposes the third research hypothesis:

Hypothesis 3: There is a significant difference in academic self-efficacy between STEM and non-STEM fields university students in Xi'an, China, with STEM students having higher self-efficacy than non-STEM students.

3. Methodology

3.1. Quantitative Research

This study utilized quantitative research methods through a cross-sectional correlation design within the non-experimental research framework. Quantitative research was adopted because, with this method, it was possible to systematically and accurately collect and analyze data in numerical form. This design allows for the measurement of the relationship between academic self-efficacy and academic performance using reliable scales within a structured framework. In this way, the quantitative research methodology ensures data objectivity and repeatability. It provides a very sound basis for further statistical analysis that may result in research conclusions with practical application value^[28].

3.2. Participants

The target population for this study is undergraduate students aged 18–23 years old in Xi'an, China. As the first education center in Northwest China, universities in Xi'an admit students from almost all walks of life, facilitating

the universality of the findings of this research into higher education in China. Because the academic environment in Xi'an uniquely combines traditional Chinese values with contemporary education reform, this provides a context that allows us to examine academic self-efficacy and academic performance in light of an appropriate mix of tradition and modernity. A total of 389 undergraduate students, including 190 males and 199 females, from 29 universities were recruited through stratified random sampling. All participants voluntarily agreed to take part in the study and completed the survey instrument designed to assess their self-efficacy and academic performance.

The data for this study were derived from a structured survey administered to students across multiple academic majors. The selection process ensured a diverse representation of participants from various educational backgrounds. To maintain data integrity, incomplete responses and cases with missing values were excluded from the final analysis. This dataset provides a comprehensive foundation for examining the role of self-efficacy in academic engagement and performance within the higher education context in China.

3.3. Research Instruments

The research instrument for this study is a question-

naire consisting of two parts (see **Appendix A**). The first part encompasses the demographic information regarding gender, age, and academic major. In contrast, the second part consists of the College Academic Self-Efficacy Scale (CASES) and the Academic Performance Scale (APS). The CASES measured the independent variable self-efficacy in this study. The 10 items of the CASES are assessed on a 5-point Likert scale, with ratings ranging from 1 (Not at all confident) to 5 (Completely confident). It measures students' confidence in executing academic tasks, including their self-regulating and task-coping abilities in an academic environment. The APS measured the dependent variable academic performance in this study. The 8 items of the APS are assessed on a 5-point Likert scale, with ratings ranging from 1 (Strongly disagree) to 5 (Strongly agree). The APS is primarily employed to assess students' academic performance in the learning process. Combining these two measures allows the researcher to thoroughly and methodically examine the connection between academic self-efficacy and academic performance, offering both empirical and theoretical justification for enhancing students' academic performance. **Table 1** presents the reliability analysis of the two measurement scales utilized in this research.

Table 1. Reliability Analysis of Scales.

Scale	Number of Item	Cronbach's Alpha
College Academic Self-Efficacy Scale	10	0.896
Academic Performance Scale	8	0.822
Total	18	0.908

3.4. Survey Administration Method

This study used an online survey administration method to facilitate data collection and effective participation. The survey was entirely implemented through the Wenjuanxing online platform. Participants accessed the survey through an online link, where they completed the same online questionnaire and provided consistent and uniform information. This study used Wenjuanxing as the basis for the survey because it is secure, easy to use, and participants can conveniently complete the questionnaire at any time that suits them. This approach ensured a streamlined

data collection process while maximizing participation rates by providing a user-friendly, accessible online survey option for university students.

3.5. Data Analysis Tool

The IBM SPSS statistical package version 21.0 is this study's key tool in data analysis. SPSS is professional software for the analysis of data. It finds widespread applications in social science research. It can easily handle both large-scale and complex datasets, thus helping researchers effectively manage and analyze data through its intuitive

interface and powerful statistical functions. This software has been proven reliable in many empirical studies involving different fields. It is most appropriate for research designs such as this study, which involves the relationship between several variables. Therefore, using SPSS as a tool for data analysis can guarantee a systematic nature of data processing, accuracy of result analysis, and scientific and repeatability of research conclusions.

4. Results

To evaluate the first hypothesis, which investigates the relationship between academic self-efficacy and academic performance, a Pearson correlation coefficient analysis was performed. As presented in **Table 2**, the Pearson

correlation coefficient between academic self-efficacy and academic performance was found to be $r = 0.594$ ($p < 0.001$). This result demonstrates a statistically significant correlation between the two variables, with a moderate to strong positive correlation. Specifically, higher levels of academic self-efficacy are linked to enhanced academic performance, suggesting that students with greater confidence in their academic abilities tend to achieve better academic performance. Furthermore, the significance level ($p < 0.001$) confirms that this relationship is statistically significant. Therefore, Hypothesis 1 was supported, and students with higher levels of self-efficacy tend to achieve better academic performance.

Table 2. Correlation of Academic Self-Efficacy and Academic Performance.

Variable	Academic Performance	
	<i>r</i>	<i>p</i>
Academic Self-Efficacy	0.594**	0.000

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

To evaluate the second hypothesis, which posits that male students exhibit higher levels of academic self-efficacy than female students, an independent samples t-test was conducted. As shown in **Table 3**, the mean academic self-efficacy score for male students was 35.70, while that for female students was 29.68. The *t*-test yielded a *t*-value of 5.99, indicating a substantial and statistically significant standardized mean difference. The *p*-value

was found to be 0.001, confirming the statistical significance of the result. These findings provide empirical support for a significant difference in academic self-efficacy between male and female students, with males demonstrating higher self-efficacy levels. This result supported Hypothesis 2, indicating that male students have significantly higher academic self-efficacy than female students.

Table 3. Academic Self-Efficacy between Male and Female.

Variable	Academic Self-Efficacy		<i>t</i>	<i>p</i>
	Male	Female		
Sex	Mean	Mean		
	35.70	29.68	5.99	0.001

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

To examine the third hypothesis, which posits that students in STEM fields exhibit higher levels of academic self-efficacy than those in non-STEM fields, an independent samples t-test was performed. As shown in **Table 4**, the mean academic self-efficacy score for students in STEM fields was 34.03, whereas the mean score for students in non-STEM fields was 27.22. The t-test produced a *t*-value of

6.80, demonstrating a substantial and statistically significant standardized mean difference. The corresponding *p*-value of 0.001 confirms the significance of this result. These results offer empirical support for the existence of significant differences in academic self-efficacy between students from STEM and non-STEM fields, with STEM students exhibiting higher self-efficacy levels. Therefore, Hypothesis 3 was

supported, and the academic self-efficacy of STEM fields was significantly higher than that of non-STEM fields.

Table 4. Academic Self-Efficacy between STEM and Non-STEM.

Variable	Academic Self-Efficacy		<i>t</i>	<i>p</i>
	STEM	Non-STEM		
Major Field	Mean	Mean		
	34.03	27.22	6.80	0.001

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Overall, these findings extend global knowledge, demonstrating that established patterns of self-efficacy differences are also evident in the Chinese higher education context. This cross-cultural validation underscores the universal applicability of self-efficacy theory and the importance of culturally sensitive educational policies and practices. Furthermore, the findings highlight that self-efficacy is a key determinant of academic performance and that it varies significantly across gender and academic major fields, providing valuable guidance for educators and policymakers in designing interventions to enhance students' academic confidence.

5. Discussion

This section offers an in-depth analysis of the study's findings, analyzing them in relation to the research hypotheses, theoretical frameworks, and existing literature. The first hypothesis explores the relationship between academic self-efficacy and academic performance. This finding indicates a significant positive relationship between academic self-efficacy and academic performance among university students in Xi'an, China. The Pearson correlation coefficient was found to be $r = 0.594$ ($p < 0.001$), signifying a moderate to strong relationship between the two variables. This result suggests that students with higher self-efficacy are likely to perform better academically, likely due to their increased confidence in their ability to succeed in academic tasks, greater persistence, and enhanced problem-solving strategies. The statistical significance of this correlation reinforces the idea that self-efficacy plays a critical role in shaping students' academic behaviors and outcomes. The results of this study are consistent with previous research conducted in various educational settings. Prior studies, including those by Honicke and Broadbent^[4] and Talsma et al.^[29], have consistently emphasized the

crucial role of self-efficacy beliefs in shaping students' academic performance. These studies suggest that strong academic self-efficacy enhances students' motivation, facilitates the adoption of effective cognitive and metacognitive strategies, promotes self-regulated learning, and fosters persistence in overcoming academic challenges. A particularly notable aspect of this study's findings is that the magnitude of the observed relationship between academic self-efficacy and academic performance appears stronger than that reported in Western contexts. This heightened effect may be attributed to the unique cultural and educational characteristics of the Chinese academic environment. The Chinese education system is intensely competitive, with a significant emphasis on academic achievement, standardized testing, and high parental expectations^[30]. Academic success is deeply ingrained in cultural values and often viewed as a key determinant of future opportunities, leading to an environment where self-efficacy plays an even more pronounced role in shaping student performance. Additionally, Chinese students face considerable external pressures, including intense societal expectations and competitive university admissions processes. In such an environment, students with higher academic self-efficacy may be better equipped to manage these demands, transforming external pressures into intrinsic motivation and demonstrating greater emotional resilience in academic pursuits^[31]. This cultural dynamic may explain why the relationship between self-efficacy and academic performance appears stronger in this study compared to findings from Western educational settings.

The second hypothesis posits that male students have higher academic self-efficacy levels than female students. Specifically, the data indicate that male students in Xi'an, China, exhibit greater confidence in their ability to manage academic tasks, such as studying effectively, completing assignments, and performing well on examinations.

The higher levels of academic self-efficacy among male students may have significant implications for their academic motivation, persistence, and overall performance. Consequently, the observed gender gap in self-efficacy may contribute to divergent academic performance, with male students potentially achieving higher levels of academic success compared to female students. This observed gender disparity aligns with prior research that has documented similar trends in various cultural and educational contexts, suggesting that gendered differences in self-efficacy may be influenced by a combination of sociocultural, psychological, and institutional factors. Sociocultural factors and educational expectations in the Chinese higher education context may contribute to this disparity. Sociocultural norms and gender stereotypes prevalent in Chinese society may play a significant role, as traditional expectations often emphasize assertiveness and confidence in males while encouraging modesty and caution in females. These gendered socialization processes may shape students' self-perceptions and influence their confidence in academic settings. Historically, STEM fields have been male-dominated, and societal perceptions often associate technical and analytical skills with masculinity^[32]. This may lead male students to develop higher self-efficacy in academic domains perceived as challenging or prestigious. Conversely, female students may experience lower self-efficacy due to cultural expectations, stereotype threat, and lower encouragement in competitive academic environments^[33]. Furthermore, parental expectations and societal pressures may differentially affect male and female students. Research from Li and Zhang^[34] suggests that Chinese parents tend to focus more on academic achievement for boys rather than girls, exacerbating gender differences in self-efficacy beliefs. This disparity could further perpetuate gendered patterns in educational attainment and career aspirations, as academic self-efficacy is closely linked to students' confidence in pursuing advanced studies or entering competitive professional fields.

The third hypothesis proposes that students in STEM fields have higher academic self-efficacy levels than students in non-STEM fields. This finding is consistent with previous studies, which have consistently reported that students pursuing degrees in science, technology, engineering, and mathematics tend to display greater confidence in

their academic abilities^[32]. The structured nature of STEM education, which emphasizes quantitative analysis, problem-solving, and systematic learning, may contribute to the development of stronger self-efficacy beliefs among STEM students. Several factors may explain these differences in academic self-efficacy. One important factor is curriculum structure, as STEM programs often have clearly defined learning objectives, sequential coursework, and standardized assessments that provide students with measurable indicators of progress and mastery^[35]. In contrast, non-STEM fields, particularly those in the humanities and social sciences, may involve more subjective evaluation methods, which could contribute to greater uncertainty in self-assessment and, consequently, lower academic self-efficacy. Another significant factor is practical skill application. STEM programs frequently integrate laboratory work, coding exercises, engineering projects, and real-world problem-solving experiences, which allow students to apply theoretical knowledge in tangible ways^[36]. These hands-on experiences provide immediate feedback and reinforcement, strengthening students' confidence in their academic abilities. In contrast, non-STEM fields often emphasize critical analysis, abstract reasoning, and qualitative assessments, which may not provide the same level of direct performance validation.

The findings provide practical insights for higher education institutions, emphasizing the need to enhance self-efficacy through instructional strategies, targeted interventions, and gender-sensitive support programs. Addressing these disparities could improve student engagement and performance across disciplines. Future research should focus on longitudinal studies to monitor shifts in self-efficacy across time, explore additional sociocultural influences, and develop targeted intervention programs to enhance students' academic confidence and success. These findings reinforce the significance of self-efficacy in higher education and offer a foundation for policy development aimed at supporting student achievement in Chinese universities.

6. Conclusion

This research investigated the relationship between academic self-efficacy and academic performance among university students in Xi'an, China, while also examining

differences in self-efficacy depending on gender and academic major field. The findings confirmed a significant positive correlation between academic self-efficacy and academic performance, reinforcing existing theories that highlight self-efficacy as a key determinant of student motivation, learning strategies, and academic success^[8]. Additionally, the study revealed that male students exhibited higher self-efficacy than female students, suggesting that sociocultural and educational influences may shape students' confidence in their academic abilities. Furthermore, students in STEM fields reported higher self-efficacy compared to their peers in non-STEM fields, a result that can be attributed to curriculum structure, hands-on learning experiences, and institutional support. These findings contribute to the broader comprehension of self-efficacy and its impact on student achievements in higher education.

Beyond confirming theoretical expectations, this study makes a meaningful contribution to academic self-efficacy research by providing empirical data specific to the Chinese university context. While previous studies have extensively explored self-efficacy in Western educational settings, studies on self-efficacy in China, particularly in highly competitive academic environments such as Xi'an, remain limited. This study bridges that gap by offering insights into how cultural, educational, and disciplinary factors interact with self-efficacy and academic performance. Additionally, by highlighting gender and academic major differences, this study highlights the significance of tailored interventions and support programs to enhance student self-efficacy across diverse academic contexts.

The implications of this research apply to educational practice and policy development in Chinese higher education. Given the strong association between self-efficacy and academic performance, universities should integrate self-efficacy-enhancing strategies into teaching methodologies, student support services, and curriculum design. Policies should focus on reducing gender disparities in academic confidence and providing additional support to non-STEM students who may benefit from structured interventions aimed at building self-efficacy. Furthermore, developing a learning atmosphere that supports mastery experiences, positive feedback, and self-regulated learning strategies can help students develop the confidence needed for academic success.

In conclusion, this research offers crucial perspectives on the role of academic self-efficacy in shaping student achievement, offering both theoretical contributions and practical applications. While acknowledging its limitations, the study lays the basis for subsequent studies on self-efficacy in different cultural and academic contexts. By informing institutional policies and pedagogical approaches, the findings emphasize the importance of cultivating self-efficacy as a way to improve student learning experiences, academic performance, and long-term educational outcomes.

7. Implications and Limitations

The findings of this study have important theoretical and practical implications. Theoretically, this research extends Bandura's self-efficacy framework by demonstrating its applicability within the Chinese higher education system. By highlighting the role of self-efficacy in shaping students' engagement, motivation, and learning behaviors, this study reinforces the significance of self-belief as a crucial determinant of academic success. Furthermore, it contributes to the growing body of literature on self-efficacy by emphasizing its domain-specific nature, suggesting that interventions aimed at enhancing self-efficacy should be tailored to the unique challenges and demands of different academic fields. Practically, the study underscores the need for educational institutions to implement strategies that foster students' self-efficacy to improve their academic performance. Educators can integrate targeted instructional approaches, mentorship programs, and constructive feedback mechanisms to help students develop confidence in their abilities. Additionally, fostering a supportive learning environment that encourages mastery experiences, positive peer comparisons, and constructive verbal reinforcement can strengthen students' academic self-efficacy. Future research should explore the long-term impact of such interventions and examine how self-efficacy can be systematically nurtured to enhance students' academic trajectories.

While this study provides valuable insights into the relationship between academic self-efficacy and academic performance, certain limitations should be acknowledged. The reliance on self-reported data introduces potential biases. Future research should incorporate objective academ-

ic measures, such as institutional records, and qualitative methods, including interviews or observations, to enhance data reliability. Additionally, the cross-sectional correlational design limits causal interpretations, as the directionality of the relationship remains uncertain. Given the dynamic and reciprocal nature of self-efficacy and academic performance, longitudinal studies tracking students over time would provide a more comprehensive understanding of these constructs. Addressing these limitations in future research would strengthen the findings and contribute to a deeper exploration of self-efficacy in higher education.

Author Contributions

Conceptualization, Y.L.; methodology, Y.L.; software, Y.L.; validation, Y.L.; formal analysis, Y.L.; investigation, Y.L.; resources, Y.L.; data curation, Y.L.; writing—original draft preparation, Y.L.; writing—review and editing, G.F.D.; supervision, G.F.D.; project administration, G.F.D. All authors have read and agreed to the published version of the manuscript.

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Appendix A

Questionnaire

Gender

- ☐ Male
- ☐ Female

Age

- ☐ 18–19
- ☐ 20–21
- ☐ 22–23

Academic major field

- ☐ STEM (science, technology, engineering, and mathematics)
- ☐ Non-STEM

College Academic Self-Efficacy Scale (CASES)

There are 10 items in this scale. How much confidence do you have about doing each of the behaviors listed below?

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of UCSI University (Ethics Code: UCSI-IEC-INT-2025-FOSSLA-MED-0002 on February 27, 2025).

Informed Consent Statement

Written informed consent has been obtained from the patients to publish this paper.

Data Availability Statement

The data that support the findings of this study are available from UCSI University, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of UCSI University.

Conflicts of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Choose the number that best represents your confidence.

- 1 = Not at all confident
- 2 = Slightly confident
- 3 = Moderately confident
- 4 = Very confident
- 5 = Completely confident

1. Listen carefully and take clear notes in lectures.
2. Participate in class discussions and answer questions.
3. Take various tests (e.g., multiple choice, true/false, essay tests).
4. Write high-quality term papers.
5. Understand and grasp the main ideas in the course, including lectures and texts.
6. Connect course content with materials from other courses and apply them in practice (e.g., lab classes).
7. Explain concepts to others and deepen understanding of knowledge.
8. Get good grades in most courses and thoroughly understand what is learned.
9. Spread study time instead of memorizing.
10. Master most of the content in math courses and other uninteresting courses.

Academic Performance Scale (APS)

There are 8 items in this scale. Please use a 5-point scale to answer each item in order to accurately reflect your performance in your study.

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly Agree

1. I can achieve grades that meet or exceed my expectations on exams and assignments.
2. I can pay attention in lectures and take notes on key points to help with subsequent review.
3. I can set and complete learning goals for each course.
4. I can make meaningful contributions and promote discussions in class or group projects.
5. I can start and complete papers, projects, or other academic assignments on time and with high quality.
6. I can use homework and extracurricular activities to improve my understanding and application of course content.
7. When faced with difficult academic tasks, I can devote more time and energy to complete my goals.
8. I can solve academic problems encountered in the learning process independently or in collaboration with others.

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